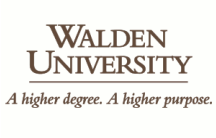

2015

Interrupting the Sepsis Process with an Evidence-Based Education Intervention

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,

and that any and all revisions required by

the review committee have been made.

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Abstract

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Martha Olson

MSN, Walden University, 2013

MS, Southwest Minnesota State University, 2003

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Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

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Abstract

Sepsis is a concern, especially for the vulnerable populations. The early signs of sepsis are vague and often difficult to detect, but when detected early, are treatable with antibiotics and fluid resuscitation. When a nurse is unaware of the early signs, treatment is delayed and multiorgan failure may progress quickly. To teach nurses about changes in patient condition and thus increase their confidence in identifying sepsis, an educational intervention, guided by adult learning theory and social learning theory, was created using a PowerPoint presentation, simulation, and debriefing. The purpose of this project was to educate nurses working in a critical access hospital on the early signs of sepsis, laboratory values, and the 2012 Surviving Sepsis Campaign Guidelines. The education was implemented and evaluated using a pre-post survey which demonstrated an increased confidence level in early sign and symptom recognition, identification of laboratory values, and implementation of the guidelines for treating sepsis. Descriptive statistics revealed that the confidence level improved following the education session in all 3 areas. Interrupting sepsis based on evidence-based practice improves the outcomes for the patient with sepsis. It also improves nurses' confidence in identifying sepsis in the early stages via clinical changes and laboratory values.

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Dedication

The project is dedicated to Dean and Diana Refsell. They have survived sepsis and helped me to see the importance for early detection and intervention to save lives. Dean is one of the lucky ones to survive sepsis when the early signs were missed and treatment was delayed. Diana is a true friend and mentor. She has helped me to grow as an educator, nurse, and human being.

Acknowledgements

I am forever grateful to my husband and children for your understanding and encouragement. My educational road has been a long one-thank you for being with me on this journey. To my parents who encouraged education from a young age. To my preceptor, Cathi Scharnberg, who shared with me her expertise of nursing leadership and administration. I would also like to thank my Walden professors, Dr. Moss, Dr. Wilson, and Dr. Beene for providing the foundational knowledge and skills I needed to complete this sepsis project.

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Section 1: Introduction

Sepsis is a systemic infectious process that will kill "one in four people" (Miller, 2014, p. 24). Early symptoms of sepsis are subtle. Identification of early sepsis is important for improving patient outcomes. Nurses are in a position to identify clinical changes in a patient that signal sepsis. The 2012 Surviving Sepsis Campaign Guidelines discuss the screening of all patients for sepsis (Miller, 2014). Knowing the signs of sepsis and evidence-based interventions can help save lives (Miller, 2014).

Overview of the Evidence-Based Project

Sepsis is a life-threatening condition, usually caused by Gram-positive bacteria (Dellinger et al., 2013). The incidence of sepsis is expected to rise because the population is becoming older and therefore will have co-morbid conditions such as cancer and human immunodeficiency virus that will place them at risk for becoming septic (Steen, 2009; Vanzant & Schmelzer, 2011).

Many do not survive sepsis. One reason that mortality rates for sepsis are high is that the early signs are very subtle and are often missed upon assessment. Early signs of sepsis are tachycardia, tachypnea, and decreasing systolic blood pressure (Dellacroce, 2009). Education is vital so that nurses understand what causes sepsis (Capuzzo et al., 2012).

The National Center for Health Statistics, as part of the Centers for Disease Control and Prevention (CDC), reported an increase in sepsis rates between the years

2000 and 2008. In 2000, the hospitalization rate for sepsis was 621,000; this increased in 2008 to 1,141,000 (CDC, 2014).

This project focused on education for nurses working in a critical access hospital. Infection rates are difficult to track because most of the patients are transferred to a larger facility that can provide specialized care (K. Mehan, personal communication, September 12, 2014).

Older adults age 85 and older have a 30 times higher rate of hospitalization for sepsis than those younger than 65 years of age (CDC, 2014). Wang et al. (2012) identified the older adult as a higher risk for sepsis because of changes to the immune system and often other co-morbid conditions. This is often due to other health conditions, such as cancer and heart disease (Wang et al., 2012). Older adults also exhibit signs of infection in atypical ways. Instead of being febrile, the older adult might exhibit cold and clammy skin and sudden confusion (CDC, 2014). For these reasons, older adults can present additional challenges to early recognition of sepsis.

Simulation and debriefing are beneficial for the adult learner—in this case, the nurse— because they can improve self-efficacy and self-confidence (Pike & O'Donnell, 2010; Weaver, 2015). This method of education allows the nurse to practice skills and use clinical judgment, without the possibility of hurting a patient (Shinnick, Woo, Horwich, & Steadman, 2011). Debriefing is a key part of the education process to allow

the learner time to reflect, as well as learn from the mistakes during simulation (Dufrene & Young, 2014).

Problem Statement

The problem addressed in the project was nurses' lack of understanding of the early signs of sepsis by the hospital nurse which can prevent the delivery of appropriate care to the patient. To address this lack of understanding, education was completed with simulation, debriefing, and the pathophysiology related to sepsis. Education on sepsis was completed because of the high incidence of mortality and morbidity when identification and treatment of sepsis is delayed.

The 2008 Surviving Sepsis Campaign Guidelines were updated in 2012 by a committee of interested experts from many international organizations. These guidelines are the basis for treatment of sepsis. Recommendations followed the "Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system" (Dellinger et al., 2013, p. 166). The GRADE system evaluates the recommendation and ranks from high to low, according to "quality of evidence" (p. 166). This group worked together to come up with the Surviving Sepsis Campaign Guidelines that offer standardization of practice based on evidence and research.

Miller (2014) discusses the need for early identification of sepsis as vital to improve patient outcomes. Nurses who are aware of the early signs of sepsis and know what nursing interventions to take, can get treatment started earlier. A time frame of 1

hour from detection of sepsis symptoms to the start of broad-spectrum antibiotics is needed to improve outcomes (Miller, 2014). The nurse is in a key position to identify sepsis and implement the sepsis protocol.

Individuals with chronic medical conditions are at a higher risk of becoming septic. The focus has been on the acute care to treat a patient that has sepsis, instead of preventing and predicting this deadly condition. Each year, 16.7 billion dollars are spent on medical expenses related to sepsis (Wang, Shapiro, Griffin, Stafford, & Judd, 2012).

Vazant and Schmelzer (2011) report analysis and review of literature demonstrates the importance for early detection of sepsis. Early recognition and prompt treatment with antibiotics improves the chance of surviving (Vazant & Schmelzer, 2011). Implementation of an educational program designed to make nurses aware of the early signs of sepsis can contribute to higher survival rates (Nguyen, Schiavoni, Scott, & Tanios, 2012).

Purpose Statement and Project Objectives

The purpose of this project was to teach hospital-based medical, surgical, and obstetric nurses about the early signs of sepsis. The education related to sepsis was anticipated to improve their confidence in detecting subtle changes early on and then implementing the evidence-based interventions recommended by the 2012 Surviving Sepsis Campaign guidelines.

Wang et al. (2012) discusses the significantly improved outcomes over the last century in the early detection and treatment of of stroke and heart disease. This change has been attributed to the use of evidence-based guidelines, early detection, and education. Sepsis, on the other hand, has not experienced the same improved outcomes. The need for education on early detection and treatment of sepsis persists. The Surviving Sepsis Campaign Bundle will require training and skills development for early detection of sepsis. Future educational offering are needed to continue to make nurses aware of sepsis.

The project included four objectives: Objective 1: Develop educational materials based on the 2012 Surviving Sepsis Campaign regarding the pathophysiology of sepsis. Objective 2: Design four simulation scenarios to promote critical thinking related to sepsis. Objective 3: Implement simulation scenarios to educate the hospital nurse about sepsis. Objective 4: Evaluate pre- and post-educational results related to identification of sepsis.

Significance to Practice

Nurses are at the bedside of the patient day and night. Thus, the nurse has the opportunity to note early, subtle changes that might indicate a patient is septic and then initiate the established sepsis protocol. But the detection of sepsis requires the nurse to know the clinical signs and laboratory values that might indicate sepsis. Appropriate

therapy that is administered early in the course of sepsis will likely influence the patient outcome (Dellinger et al., 2013).

According to infection control nurse Kathy Mehan, critical access hospitals are not exempt from sepsis cases. Tracking infection rates for small critical access hospitals is difficult because most of the patients are transferred to a larger facility that can provide specialized care (K. Mehan, personal communication, September 12, 2014).

Currently, many hospitals screen for sepsis twice a day with automatic computer prompts (K. Mehan, personal communication, September 12, 2014). The screening requires the nurse to assess risk factors, current vital signs, and patient condition. Screening tools help with the detection of sepsis. Screening tools have helped to decrease mortality related to sepsis (Dellinger et al, 2013). Education on the pathophysiology of sepsis will help the nurse complete the risk screening tool. Understanding the pathophysiology of sepsis provides a better understanding of the basis for the pathological changes in vital signs and patient condition that are being monitored on a regular basis.

Dellinger et al. (2013) stated that the "greatest outcome improvement can be made through education" (p. 167) and implementation of a process to care for those with sepsis. The Surviving Sepsis Campaign committee is hopeful that the educational programs on sepsis and other improvement initiatives, based on the current guidelines,

will have a positive influence on the nurse that is at the bedside. This education will help decrease sepsis in hospitals everywhere (Dellinger et al., 2013).

The education on sepsis is important to nursing practice because early intervention improves outcomes and saves lives. Early detection and prompt treatment also decrease healthcare expenses (Dellinger et al., 2013). The nurse has the ability to screen, assess, and implement interventions that might make the difference between life and death. Dellinger et al. (2013) identified that education on how to implement the protocol and providing "performance feedback" (p. 173) helps change the behavior of the caregiver. This is associated with reducing the cost of sepsis and improving patient outcomes (Dellinger et al., 2013). Saving lives with early sepsis intervention is a significant contribution the nurse can make to not only practice, but society. Ongoing education is needed to sustain awareness of the condition.

Project Questions

Does the nurse identify early laboratory changes related to sepsis following an evidence-based presentation?

Does the nurse identify early clinical signs related to sepsis following an evidence-based presentation?

Does the nurse identify Surviving Sepsis Campaign Guidelines following an evidence-based presentation including simulation and debriefing?

Evidence-Based Significance of Sepsis Education

Teaching nurses about sepsis is considered fundamental to improving patient care safety and outcomes. To make this a reality, a "competent and confident workforce" (Burnett, Curran, Loveday, Keirnan, & Tannahill, 2013, p. 14) is needed to address infection control practices and reduce healthcare-associated infections. An evidence-based educational intervention on sepsis will help nurses become more competent in the early identification of clinical signs of sepsis, and more confident in initiating the recommended Surviving Sepsis Campaign bundles or guidelines for best practice. Burnett et al. (2013) recommend implementation of education, programs, and interventions in a systematic way to be sure that healthcare professionals can provide quality care. Nurses provide direct care and have the ability to impact patient outcomes.

Sepsis education is needed for all members of the healthcare team. Chen, Chang, Pu, and Tang (2013) reported that the outcomes from an educational program do have a "significant impact" (p. 1) from changed physician behavior to identify and implement sepsis treatment. Sepsis rates in the United States have continued to rise, but the in-hospital mortality rate for sepsis has improved significantly (Chen, Chang, Pu, & Tang, 2013). Capuzzo et al.(2012) also focused on education for the hospital staff, based on the Surviving Sepsis Campaign Guideline bundles. They noted that the educational program yielded improved early detection with a reduced risk of death (Capuzzo et al., 2012). Education has the ability to decrease the mortality of sepsis when identified and treated early.

Education provides opportunity for improvement in nursing practice. Behavior is shaped by education. Billings and Halstead (2012) discuss how education influences behavior and is used to achieve specific goals. Fundamental to behavioral learning theories is the fact that permanent behavior change can be accomplished with learning that is concurrently reinforced (Billings & Halstead, 2012). Adult and social learning theory were the basis of this educational project. Education on sepsis can create behavior change for the nurses in this project.

The nurse is often the first healthcare provider to complete a physical assessment. Miller (2014) describes the need for early identification of sepsis. When not identified early, the infection quickly becomes severe sepsis, involving hypoperfusion that results in organ damage and tissue hypoxia. This early identification by the nurse is essential to initiate interventions and prevent the patient from progressing into septic shock with continued hypoperfusion despite intravenous fluid resuscitation (Miller, 2014).

Screening patients includes noting subtle changes. These changes are noted in the vital signs, such as tachycardia, tachypnea, and hypotension. Identifying signs of early infection and changes in urine output, laboratory values, and biochemical markers are the signs that nurses must be aware of. When sepsis is identified early and goal-directed interventions are initiated, mortality decreases (Miller, 2014).

This project is significant to all areas of nursing because a patient in any area of the healthcare system can show early signs of sepsis that need to be identified and treated.

This also includes residents in long-term care facilities. Ginde, Moss, Shaprio, and Schwartz (2013) report that older adults, especially those living in a long-term care facility, have a higher incidence of severe sepsis, as well as higher morbidity. Severe sepsis includes not only the bacterial or fungal infection, but also the concurrent organ dysfunction (Grinde, Moss, Shaprio, & Schwartz, 2013).

A large elderly population resides in the county where the project was completed (Iowa Aging.gov, n.d.). This project will help provide quality care to the population in this rural area.

Implications for Social Change in Practice

Educating nurses about the early signs of sepsis has implications for social change. As a result of such training, improvements in nursing assessments and interventions can improve safety and quality in healthcare and lower mortality rates.

The Institute of Medicine (IOM) has been instrumental in initiating this by publishing the seminal reports *To Err Is Human: Building a Safer Health System, Crossing the Quality Chasm,* and *Health Professions Education: A Bridge to Quality*. In these reports that impact nursing, quality, evidence-based practice, and nursing education are addressed. Educating nurses to be part of the interdisciplinary team, provide care at the highest level, and to improve education for the nurse will improve morbidity and mortality (Terry, 2012).

Nurses have the ability to change patient outcomes with continued education and leadership competencies. The competencies needed for the nurse of today include "expert decision-making skills that are evidence based" (Billings & Halstead, 2012, p. 102). Other essential competiencies include patient quality and safety within the organization, as well as being proactive to healthcare needs. The IOM encourages interdisciplinary competence and educating nursing to be part of the healthcare delivery system that seeks to improve care provided. To accomplish this, interdisciplinary competence encourages increasing knowledge for all professionals caring for the patient (Billings & Halstead, 2012).

The *Future of Nursing* report continues to have implications for the nurse. Nurses practicing to their full scope and education can function within the interdisciplinary team to help improve patient outcomes. Transforming Care at the Bedside (TCAB), funded by the Robert Wood Johnson Foundation starting in 2003, has redesigned the work of the nurse. The TCAB has four parts that include implications for competencies in the development of knowledge and attitudes to improve patient outcomes with teamwork, patient-centered care, and development of skills for the nurse (Billings & Halstead, 2012).

All areas of nursing practice are impacted by sepsis, especially those working with high-risk populations, such as the elderly, immunocomprosmised, and those with chronic health problems. Ginde et al. (2013) report that older members of our society

have the greatest impact because the elderly have a high incidence of sepsis. The incidence increases as the elderly live to an advanced age. This places a higher burden on society in this country to care for this population. Educating the nurse working with the elderly can help with early identification of sepsis in this high risk population.

Centers for Medicare and Medicaid services have implemented a pay for performance process. Central line associated bloodstream infections (CLABSI) is one cause of sepsis. This infection is preventable, yet continues to kill "thousands of people" (White & Dudley-Brown, 2012, p. 79) in this country each year. Decreasing infections that lead to sepsis is an important part of not only saving human lives, but also saving money for the national health care system. This has the ability to impact costs to the health care system. The benefit to society has many implications. White and Dudley-Brown (2012) call for more rigorous research to provide data and measurable results.

Education related to sepsis is not only intended for the staff nurse at the bedside, but also the board members. Education and training for safety and quality needs to be at all levels of the healthcare system (White & Dudley-Brown, 2012). This project educated the nurse, with wider implications for other areas of healthcare. Education for the facility to implement at-hire and annual education on sepsis can help keep the nurses aware of the current sepsis guidelines and confident to follow the Surviving Sepsis Guidelines bundles. Education is also needed for the obstetrics staff to identify sepsis in the newborn. Like the elderly, the newborn can have vague symptoms (Mussap, 2012; Shah

& Padbury, 2014). Data on sepsis rates and outcomes hospital wide can be followed over a longer period of time.

Definition of Terms

Early goal-directed therapy: resuscitation started early that targets physiologic goals (Dellinger et al., 2013).

Immunosenescence: " the age-related decline in immune function" (Grinde, Moss, Shapiro, & Schwartz, 2013, p. 610).

Sepsis: "the presence (probable or documented) of infection together with systemic manifestations of infection" (Dellinger et al., 2013, p. 168).

Septic Shock: "sepsis-induced hypotension that persists despite adequate fluid resuscitation" (Miller, 2014, p. 26).

Severe Sepsis: "sepsis plus sepsis-induced organ dysfunction or tissue hypoperfusion" (Miller, 2014, p. 24).

Assumptions, limitations, and delimitations

The following assumptions were made in carrying out this study:

1. Nurses participating in the education intervention provided honest answers to the responses on the evaluation.

This study was subject to the following limitations:

1. The sample was minimally diverse in regards to ethnicity and gender, which affected the generalizability of the findings. Measures to address this limitation were not addressed.

This study was subject to the following delimitations:

1. This study was limited to nurses in Emmet County, Iowa.
2. This study was limited to adult and older adult sepsis.

Summary

Early signs of sepsis are often subtle. Detection of sepsis requires a nurse to identify the changes in the patient assessment, vital signs, and laboratory values. Unless sepsis is treated in the early stages, it will progress into septic shock. Early identification and treatment following the established Surviving Sepsis Campaign Guidelines protocol has "been shown to significantly improve survival rates" (Vanzant & Schmelzer, 2011, p. 47).

Evidence-based education using simulation and debriefing was expected to provide the nurse with the knowledge and confidence to detect sepsis. Sepsis education to help decrease this often fatal condition will benefit not only the patient, but also many other aspects of healthcare and society. People with risk factors for becoming septic are more prevalent today. More people today are immunocompromised, have resistance to antibiotic therapy, and are living longer. These factors put them at risk for sepsis

(Vanzant & Schmelzer, 2011). Other factors exist such as invasive surgery to the bowel, pneumonia, and invasive tubes and lines that increase the risk of a person getting sepsis. Education was provided to help the nurse understand the pathophysiology of the subtle signs of sepsis, laboratory values that help diagnose sepsis, and established treatment options.

Section 2: Review of the Scholarly Evidence

Introduction

The purpose of this project was to increase the confidence of the hospital nurse working in the medical, surgical, and obstetric unit of a small, critical access hospital. Education was provided to help the nurses understand the subtle changes of early sepsis and the guidelines for treatment. The 2012 Surviving Sepsis Campaign Guidelines include antibiotic and fluid administration. Early intervention improves the outcome of sepsis (Ginde, Moss, Shapiro, & Schwartz, 2013).

Sepsis rates are alarming with increased mortality and morbidity, especially when treatment is delayed. Early recognition is needed to improve outcomes. The nursing assessment can note the subtle changes in a patient condition, signaling early sepsis. Education provided information to the hospital nurse on sepsis. Adult learning and social learning theory supported this project.

Literature Search Strategy

Several library databases used were used. These included MEDLINE, CINAHL, ProQuest, PubMed, Science Direct, ERIC, Education Research Complete, and SAGE Premier. Key search terms used in the review of literature included sepsis, septic shock, pathophysiology, Surviving Sepsis Guidelines, older adult, adult learning theory, social learning theory, simulation, debriefing, infection control, statistics, self-efficacy nursing simulation, self-confidence nursing simulation, nursing home, long-term care, and

septicemia. The literature review included two years of research with professional journals, webinars, and nursing textbooks.

Specific Literature

The purpose of the literature review was to provide support for the early identification of sepsis. Early identification of sepsis symptoms contributes to timely initiation of the established sepsis bundles for early goal-directed therapy. The guidelines were written to provide consensus with treatment (Nguyen, Schiavoni, Scott, & Tanios, 2012). The Surviving Sepsis Campaign Guidelines for Management of Severe Sepsis and Septic Shock were updated in 2012. These guidelines were developed by numerous experts worldwide.

Considered a major problem in healthcare today, sepsis and septic shock rates remain unacceptably high with the incidence increasing. One way to improve the mortality rate related to sepsis is to start appropriate therapy quickly. Therapy can only be initiated in a timely manner if the nurse identifies the signs of sepsis. The need for immediate implementation of antibiotics and fluid resuscitation in the initial hours of the patient developing sepsis will have an influence on the outcomes (Dellinger et al., 2013). This project on the early identification of sepsis was guided by the Surviving Sepsis Campaign Guidelines to help educate the nurse on the pathophysiology related to the signs of early sepsis to assist with early identification of sepsis signs. Education on the Surviving Sepsis Campaign included the use of antibiotics and fluid resuscitation from

the sepsis bundles, as well as the vasopressors used to improve blood pressure (Miller, 2014).

The management of sepsis requires early goal-directed therapy for improving survival rates (Dellinger et al., 2013). When sepsis is not detected early, the sepsis bundle is not initiated. When this happens, the infection is allowed to overwhelm the body. Obtaining a diagnosis in a timely manner is one of the vital, first steps that is considered a "critical component of reducing mortality" (Dellinger et al., 2013, p. 173). This project focused on the identification of the early signs and laboratory values that help to detect early sepsis and improved the confidence of the nurse in initiating the protocol.

The Surviving Sepsis Campaign bundles focus on early intervention with the one, three, and six hour bundles that include specific measures that need to be completed to improve outcomes. Timely treatment was researched by Vilella and Seifert (2014). A retrospective case-control study was conducted to determine the clinical outcomes for the patient related to the amount of time in the emergency room from diagnosis to initiation of the first intravenous antibiotic treatment. Vilella and Seifert (2014) call the time from diagnosis of sepsis to intravenous antibiotics the "golden hour" (p. 7). This sensitive time for initial diagnosis and treatment was compared to the patient that presents with an acute myocardial infarction or stroke. Improved outcomes depend on early recognition and prompt treatment within an hour (Vilella & Seifert, 2014).

To improve the process for sepsis identification, Dellinger et al. (2013) recommend ongoing education, development of established protocols that are consistently implemented, as well as data collection and measurement. Education on the protocols used to detect and treat early sepsis is associated with improved performance by clinicians. The education process helps change behavior related to sepsis, that in turn improves cost and outcomes for the patient (Dellinger et al, 2013).

Specific to sepsis, Wang et al. (2012) conducted a longitudinal cohort study with 30,239 people from the community to determine the relationship of sepsis with chronic medical conditions. The individual with existing chronic medical conditions is at increased risk for developing sepsis in the future. Patients with "pneumonia, kidney and urinary tract infections, and abdominal infections" (Wang et al., 2012, p. 3) are the most common infections associated with a patient becoming septic. The association of sepsis risk with chronic medical conditions has implications for the nurse. Simulation in this project provided the nurse this specific information to increase the awareness for sepsis in this high risk population.

This project was implemented in a small, critical access hospital. Nguyen et al. (2012) also implemented an educational program for sepsis management guidelines in a community hospital. Using an observational cohort study, they implemented a quality improvement program based on the Surviving Sepsis Campaign guidelines. The sepsis program provided consistent protocol to follow when sepsis was detected. Improved

interventions and survival rates are attributed to the program in this community hospital and the nursing care provided (Nguyen et al., 2012).

The Surviving Sepsis Campaign has 63 recommendations specific for nursing. Authors Kleinpell, Aitken, and Schorr (2013) served on a committee representing nursing for the task force that made the Surviving Sepsis Campaign 2012 update revisions. Many of the changes include protocol to follow that have implications for the nurse. Knowledge of sepsis by the nurse and the recommendations of the Surviving Sepsis Campaign help to bring the most current evidence-based guidelines to the bedside. The updated guidelines focus on early intervention and diagnosis (Kelinpell, Aitken, & Schorr, 2013). This project used the Surviving Sepsis Campaign protocol in the simulation. The nurse had an opportunity to not only learn the protocol, but also apply it during simulation and discuss it during debriefing.

Grinde, Moss, Shaprio, and Schwartz (2013) studied adults older than 65 years of age to compare the impact of this increased age and living in a nursing home for the incidence and morbidity related to sepsis. In a retrospective analysis of 19,460 visits to the emergency room, the study examined clinical outcomes for the older adult with sepsis. These outcomes included admission to the intensive care unit, length of stay in the hospital, and mortality while in the hospital. The findings from this study included a very high rate of sepsis and morbidity for the older adult (Grinde et al., 2013).

The Surviving Sepsis Campaign Guidelines (2014) site offers evidence-based recommendations directly related to the bundles. The three and six hour bundles include the background, limitations, implications, and grading of the evidence. The Surviving Sepsis Campaign bundles, when implemented as a group, "have an effect on outcomes beyond implementing the individual elements alone" (Surviving Sepsis Campaign, 2014, para 1).

The specific literature provides the nurse with an understanding of the people that are at higher risk for sepsis, as well as the need for early detection. The main theme discussed in the specific literature is early detection and intervention. Clear guidance for the implementation of the Surviving Sepsis Campaign bundles was provided to help the nurse follow the established protocols.

General Literature

Burnett et al. (2013) recommend infection control programs be implemented, even though they take effort to complete and sustain changes in practice. Healthcare associated infections add to the burden with increased hospital length of stay, disability, and financial costs. Challenges for healthcare include not only preventing infections, but also early identification of the infectious process with prompt treatment (Brunett et al., 2013).

The value of sepsis education is seen in many countries, including Italy and Taiwan. Capuzzo et al. (2012) also educated hospital staff on sepsis in Italy. The focus

was on the clinical signs and initial resuscitation procedures. The method of teaching was by lectures, practice training, and finally handouts with information realted to laboratory and clinical signs. Chen, Chang, Pu, and Tang (2013) completed a national education in Taiwan. Chen et al. (2013) reported a significant change in the clinical practice with a reduction in the mortality rates related to sepsis.

Sepsis rates are concerning not only to the Institute of Medicine, but also those that track infection rates within an organization. Accrediting bodies are interested in sepsis rates. The accreditation process looks at many factors within the organization. Infection control nurses track and report infections within the organization. Information related to infection is collected during a survey of the organization. The infection control nurse is responsible for the education and tracking to help an organization decrease infection rates, including sepsis. Survey teams look at the daily logs of infection, education completed by the infection control nurse, and trends related to infections (K. Mehan, personal communication, October 17, 2014).

Miller (2014) and Steen (2009) discuss pathophysiology changes related to the sepsis process and the implications for the nurse. Miller (2014) reviews the updated guidelines from the Surviving Sepsis Campaign and offers examples of patient scenarios and how they would be treated. Steen (2009) identifies why sepsis rates will continue to increase. The aging population and their complex health issues decrease the immunity in the older adult predisposing many in our population to sepsis. The stages of sepsis are

explained, along with the pathophysiology for the local and systemic inflammatory responses noted in the patient with sepsis (Steen, 2009). This project not only discussed the early and later symptoms of sepsis, but educated the nurse on the underlying pathophysiology causing the symptoms. This contributed to the scientific understanding of sepsis.

Theoretical Framework

This project promoted education for the early identification of sepsis was based on adult learning theory and social learning theory. Theories are useful for the profession of nursing to help provide "structure and organization to nursing knowledge" (McEwen & Wills, 2011, p. 23). Practice, research, and theory have an interactive relationship with each other to help build nursing knowledge. Theory is also useful to help with the systematic collection of data to support and validate nursing interventions (McEwen & Wills, 2011).

Adult learning theory is useful for sepsis education for the nurse because it is based on the adult learner that wants to learn what is important to know. With experience, the nurse is motivated and ready to learn information that will be immediately useful and practical. This motivation is internally driven. The application to nursing is the ability to use the new information in clinical practice to identify sepsis and initiate appropriate interventions based on the Surviving Sepsis Campaign bundles (McEwen & Wills, 2011).

Adult learning theory, as described by Cooper (2009) is a theory that tells us that adults learn in different ways than children. Andragogy is adult learning. This is different than how children learn. Adult learning theory, based on the unique needs of the adult learner, promotes application of information and learning opportunities. Based on andragogy, the adult learner will learn information when viewed as important and valuable to them. Adult learners are motivated when they see the reason for the information to be learned and immediately useful (Cooper, 2009). To help the adult learner see value and application to the early identification of sepsis, the use of simulation with scenarios, followed by debriefing was used.

Simulation with manikins was used in this project for educating the nurse on the early detection of sepsis. Social learning theory, first discussed by Bandura, is described as learning from watching others . Simulation provides opportunities for the nurse to learn and practice skills related to detection of sepsis in an environment that promotes "observational learning or modeling" (Rutheford-Hemming, 2012, p. 132).

Based on self-efficacy or the belief in self, social learning theory provides social learning through observation and the watching others. McEwen and Wills (2011) describe how social learning theory provided benefit for the nurse in this project. People learn from watching and being with others, observing what they do, and how they do it. During this project, the nurses worked cooperatively in each scenario. Debriefing followed the simulation scenarios.

Pike and O'Donnell (2010) describe how self-efficacy is a strong predictor of performance. This belief in self is known to improve performance in many areas. Research with simulation shows direct and strong correlations between simulation and self-efficacy (Pike & O'Donnell, 2010). Small groups of nurses used simulation to practice different situations related to sepsis. Debriefing followed the simulations. Pre-survey and post-survey results indicated that the nurses learned and felt more confident in identification of the signs of early sepsis. Social learning promotes learning from each other and developing confidence in the skills being practiced (Pike & O'Donnell, 2010). Simulation in this project involved small groups of nurses learning from each other to enhance their self-efficacy related to sepsis identification.

Debriefing used after simulation allows the participants to explore and discuss the simulation experience with each other and the instructor. Discussion on what went well and what could be changed in the future helps the participants to learn in a safe environment. Described as the cornerstone of simulation, debriefing fits well with adult learning principles described by Knowles (Gardner, 2013). Debriefing is best completed when students are allowed to reflect on their actions and discuss the decisions they made during the simulation (Shinnick et al., 2011). Wickers (2010) describes debriefing being most successful when the learner feels safe and in a supportive environment. The facilitator needs to be within the group following debriefing to help "distribute the focus of the learning" (Wickers, 2010, p. e83-e84) and engage students.

Working in a complex healthcare system with patients that often have many co-morbid conditions, nurses must be life-long learners. Nurses want to learn, but are often faced with barriers that keep them from knowing the most current guidelines. Barriers nurses often face for lack of continuing education include night shift hours, overtime worked, complex patient care, and personal stressors (Cooper, 2009). To help the nurse meet learning goals and needs, adult learning theory and social learning theory was used in this project to promote increased knowledge on the early identification of sepsis for the hospital nurse.

Section 3: Approach of the Project

Introduction

The purpose of this project was to teach hospital-based medical, surgical, and obstetric nurses about the early signs of sepsis in order to improve their confidence in detecting subtle changes early on and then implementing the evidence-based interventions recommended by the 2012 Surviving Sepsis Campaign guidelines.

Current evidence, webinars, and the literature review guided the development of the educational materials. This educational project got input on the needs assessment on infections and sepsis from the SDWG, a governance group of nurses from various units within this critical access hospital. It also got input from the infection control nurse that included statistics of sepsis within this organization, past education for the nurses on

sepsis, and current surveillance being conducted. While I created and implemented the PowerPoint and simulation, the SDWG contributed input for the simulation experience. I developed, implemented, and evaluated this project at a small, critical access hospital. The results of this project, which are important to the SDWG, will be included in the hospital's annual report.

Project Design and Methods

The sepsis topic was identified by the SDWG to help bring awareness of the implications of infection control and the need for improved infection control in the hospital. The infection control nurse was also included in this needs assessment. Hodges and Videto (2011) discuss the importance of a needs assessment to identify the target population, contributing factors for this problem, and the solutions. The needs assessment must also identify possible limitations for the program, to help minimize the barriers that might exist. Project evaluation was also a consideration during the needs assessment. The planning and implementation of the project are the start of the evaluation process (Hodges & Videto, 2011).

Approval was obtained from this critical access hospital and the Walden University Institutional Review Board (03-02-15 #0265967) prior to the sepsis education. The participants gave implied consent (Hodges & Videto, 2011). No control groups were utilized for this project (Terry, 2012). Recruitment was voluntary. No nurses were excluded. This hospital employs 72 nurses (full and part-time, as well as causal status).

The desired sample size was 20% of the nurses at this facility. The actual size for the project was 17 participants or 23.6% who participated.

Pre-survey and post-survey questionnaires were completed anonymously. Participant confidentiality was maintained. I provided the purpose of the survey, how the survey was to be completed, and that the participation was voluntary. The participants were also informed that they could choose to not participate at any time. The surveys were completed in a private area to allow participants to complete them without interruptions (Terry, 2012). The completed surveys are kept secure by locked files in nursing administration at the critical access hospital. Ethical principles for the proposed project were followed.

Development of the project included a PowerPoint presentation to educate the nurses, followed by simulation scenarios for hands-on learning and debriefing. The PowerPoint presentation included statistics both locally and nationally for sepsis, as well as the pathophysiology and vulnerable populations affected by sepsis. The PowerPoint provided the scientific foundation for the clinical signs and changes noted in the patient with early and late sepsis. The PowerPoint outline included specifics on the education (Appendix D).

The project used low fidelity manikins for the simulation. Simulation included scenarios with the most common types of patient situations that cause sepsis. Early symptoms, laboratory values, and implementing the Surviving Sepsis Guidelines protocol

were the basis for simulation with patient situations (Appendix D). Manikins and supplies were available.

Implementation of the project was completed following the IRB approval. Confidence to identify and treat sepsis was evaluated using the survey tool completed by the nurse before and after the education on sepsis (Appendix B and C). Following the PowerPoint presentation, nurses in small groups completed simulation scenarios that included early signs of sepsis, use of laboratory tests, and administration of antibiotics, as well as fluid replacement and vasopressors. Cooperative and active learning strategies were used to help the nurse apply the information on sepsis in an actual setting using simulation following the Surviving Sepsis Campaign Guidelines.

Debriefing followed the simulation for each group. According to Arafeh, Hansen, and Nichols (2010), debriefing is considered a "critical aspect of simulation" (p. 302) where "most of the learning occurs" (p. 308). Debriefing allowed the nurses in this project to discuss the simulation and impact on their ability to identify and treat sepsis following the established protocol. Following debriefing, the nurse participant completed the sepsis education survey (Appendix C). Evaluation of the proposed project included results of the pre-post survey completed by the nurse participants.

Population and Sampling

The population included hospital nurses in a small, rural, critical access hospital in Iowa. This facility employees 72 nurses with 17 that participated in this education on

sepsis. Convenience sampling included the hospital nurses that attended the educational program. Time of nurse licensure in the state of Iowa and age varied. This project included nonprobability sampling. Inclusion in this project was nurses that attend the education session. Exclusion criteria were those nurses that did not attend the educational project. No agreements were made with the nurses that participated in this project. No incentives were provided for participating in this project.

Data Collection

Data collection consisted of three questions. Data was collected via survey both before and after the education. Data collection instruments included a pre-survey and post-survey (Appendix B and C) to assess confidence felt by the nurse about the identification of early signs of sepsis using a three-point rating scale using very *confident, confident,* or *minimally confident*. The survey was evaluated by three Master in Science of Nursing (MSN) educators at Iowa Lakes Community College in Emmetsburg, Iowa. The evaluation tool was also evaluated and critiqued by the chief nursing officer for the critical access hospital where the education project was conducted.

The participants were informed of their right to withdraw from the educational project at any time. They were also informed of the project purpose before the educational program started. The administration of the survey was at the beginning of the program and the end of the debriefing. Surveys were completed by all participants. No surveys were incomplete. All participants completed the entire program and survey. I

completed the education sessions during multiple time frames over a week to allow as many nurses as possible to participate and minimize the barriers associated with attending an education session.

Data Analysis

The project was evaluated by administering and collecting the surveys. The results were analyzed and tabulated to compare the respondents confidence level related to sepsis before and after the sepsis education (Table 1).

Table 1 Confidence Level Before and After Education Session

	Pre Questionnaire Number of participants (%)	Post Questionnaire Number of participants (%)
Early signs and symptoms of sepsis	Very confident 1 (0.05) Confident 11 (64.7) Minimally Confident 5 (29.4)	Very confident 16 (94.1) Confident 1 (0.05) Minimally Confident 0 (0)
Early laboratory diagnostic tests for sepsis	Very confident 1 (0.05) Confident 13 (76.5) Minimally confident 3 (17.6)	Very confident 12 (70.6) Confident 5 (29.4) Minimally Confident 0 (0)
Implementation of the Surviving Sepsis Campaign Bundle for sepsis	Very confident 0 (0) Confident 7 (41.2) Minimally Confident 10 (58.8)	Very confident 10 (58.8) Confident 7 (41.2) Minimally Confident 0 (0)

N = 17 participants

The results demonstrated an improved confidence level in the identification of early symptoms, laboratory values used to detect sepsis, and implementation of the sepsis bundles. The greatest improvement in self-rated scores was noted in identification of early symptoms with 94.1% of the nurses indicating they are very confident following the education. Pre-education ratings indicated that only one nurse was very confident before the education and five nurses were minimally confident (Table 1).

The area with the least improvement noted was the second question related to laboratory diagnostic tests for sepsis. Confidence was 76.5% before the education. The post education survey demonstrated 29.4% confidence and 70.6% of the respondents were very confident (Table 1).

The third question, Implementation of the Surviving Sepsis Campaign Bundles, identified 58.8% of the nurses minimally confident before the education. Self-confidence related to the implementation of the bundles improved following the simulation and debriefing with 58.8% reporting very confident and 41.2% confident (Table 1).

The results were interpreted and discussed with the practicum mentor, SDWG, and hospital administration. The evaluation activities will be reported in the annual hospital report (Hodges & Videto, 2011). Education related to ongoing sepsis education was discussed with administration.

Project Evaluation Plan

Evaluation of the sepsis project included process, formative, and impact evaluations. Process evaluation looked at the schedule of the nurse to attend the sepsis education and the program recruitment. Formative evaluation determined if the time for the program worked into the schedule for the nurse working 12-hour shifts. Impact evaluation included the survey results comparing the pre-survey and post-survey responses. Hodges and Videto (2011) identify impact evaluation measuring the ability of the sepsis education to cause the intended short-term goals of behavior change and early identification of sepsis with confidence in the hospital nurse.

The schedule to attend the education was over several days to accommodate nurses working 12-hour shifts. The hours were varied to meet the needs of the different departments and their workflow. This process evaluation also includes the recruitment with email messages announcing the education session and communication from nurse managers to their staff.

Formative evaluation addressed the time of the education. Education was offered in the afternoon and evening hours to allow nurses to come before, during, or after their work schedule. Most came during work hours in the middle afternoon when the work flow of the shift was quiet. Nurses working in same day surgery did not attend this education due to the high census during this time. Providing education to this group will need to be evaluated further to meet their learning needs.

Impact evaluation looked at the survey results. The hospital network system began a sepsis campaign one year ago. This campaign included screening on every adult patient every shift. This campaign also included the ability to conduct a lactic acid level in the hospital laboratory. Previously, lactic acids were a send out laboratory result. It also included the campaign promoting identification of vital sign changes that might indicate sepsis. Evaluation of the results of the survey might be impacted by the previous interventions completed within this organization that address diagnostic tests. The area with the most improvement in confidence scores is the ability of the nurse to identify the early and vague signs and symptoms of sepsis. This was not previously addressed by the hospital campaign on sepsis (Table 1).

The completion of the project analyzed the self-reported confidence level of the nurse attending the education session related to the identification of sepsis symptoms, early laboratory values to diagnose sepsis, and implementing the Surviving Sepsis Campaign bundles. The project results were compiled to help provide information on the "themes, patterns, and structures that emerged in the text" (Terry, 2011, p. 175). A summary of the results indicate the nurse is more confident following the education session (Table 1). Future data collection will help support the need for continued education on sepsis.

Summary

This project started with a needs assessment and input from the stakeholders. A program was developed that included education, simulation and debriefing. The program focused on the education of early sepsis signs and laboratory values, as well as the Surviving Sepsis Campaign guidelines. It was provided to the nurses at this critical access hospital. Data was collected using a pre-survey and post-survey. This survey was completed by all of the participants. The project was evaluated using process, formative, and impact evaluations and shared with the SDWG and administration. The project results will also be included in the annual hospital report. Dissemination of the project outcomes will be presented at a regional health conference June 5, 2015 at Okoboji, Iowa.

Section 4: Discussion and Implications

Introduction

The purpose of this project was to teach hospital-based medical, surgical, and obstetric nurses about the early signs of sepsis in order to improve their confidence in detecting subtle changes early on and then implementing the evidence-based interventions recommended by the 2012 Surviving Sepsis Campaign guidelines. This research project was carried out with nurses at a rural, critical access hospital to teach them about the early signs of sepsis. Education, simulation, and debriefing were used. The research questions were as follows:

1. Does the nurse identify early laboratory changes related to sepsis following an evidence-based presentation?
2. Does the nurse identify early clinical signs related to sepsis following an evidence-based presentation?
3. Does the nurse identify Surviving Sepsis Campaign Guidelines following an evidence-based presentation?

Pre-post surveys were completed privately by each participating nurse. The final sample included 17 nurses. This study design compared the confidence of the nurse in identification of sepsis before and after the educational project. Confidence levels improved for the participant following this education. The study design compared the three-part Likert-type responses (*very confident, confident, minimally confident*) of the

nurses before and after the training. A sample size of at least 15 nurses was desired for this project to help ensure generalizability. No descriptive statistics were collected due the nature of the project questions. The pre-surveys and post-surveys were evaluated by three nurse educators, all of whom hold a Masters in Science of Nursing (MSN) from Iowa Lakes Community College because survey questions were not previously validated. No surveys had missing data.

According to Terry (2012), without randomization or use of a control group, it can be difficult to "attribute causation to the intervention" (p. 71) without using a pretest-posttest design. Future projects on sepsis could benefit from a different type of test design, such as the Solomon four-group. The benefit of this is the "ability to assess the presence of the pre-test sensitization" (Terry, 2012, p. 71). For this project, the pre-education confidence with nurses from various departments might be different due to the exposure to patients with sepsis that are transferred to another facility, instead of being admitted and cared for by the medical-surgical staff. Emergency room nurses help transfer septic patients.

Nurses are in a unique position to identify the early and often vague signs of sepsis in the patients they assess and care for. This study provided education based on both adult learning theory and social learning theory. The nurses participating in the project asked questions during the education session and made comments about their experiences with sepsis. Nurses working in the emergency room verbalized being more

aware of the lactic acid being drawn on patients for sepsis identification and the protocol that is used once sepsis is identified.

The questions used in this project on sepsis were answered. Question 1 asked the nurse to rate the confidence level related to the ability to identify early clinical signs related to sepsis following an evidence-based presentation. The analysis revealed that 16 nurses felt very confident and one nurse felt confident following the education. Participants' scores for confidence increased following the education project (Table 1).

Question 2 asked the nurse to identify early laboratory changes related to sepsis. This is the area where nurses discussed the use of this in the emergency room at this time. Confidence levels before the education were 13 nurses rating confident and one very confident. Following the education, this improved to 12 nurses rating very confident and five being confident, with no responses for minimally confident (Table 1).

Question 3 asked the nurse about confidence related to the ability to implement the Surviving Sepsis Campaign Guidelines following an evidence-based presentation. Again, the results demonstrated an increase in confidence when comparing the pretest-posttest education results with no nurses feeling very confident before the education presentation. This confidence level improved to ten nurses rating very confident and seven rating confident, without any participants rating minimal confidence (Table 1).

This study had several limitations. The first limitation included a small sample size of 17 nurses from one small facility. The second limitation included convenience

sampling with 23.6% of the nurses employed at this critical access hospital that volunteered to participate. The small sample size was due to scheduling conflicts and staffing patterns during implementation of the project. An increased sample size and longer duration of educational sessions would benefit this project. Another consideration is that convenience sampling has a high risk for bias and "questionable representativeness" (Terry, 2012, p. 129).

Data collection was conducted when the nurse was either not scheduled to work or able to attend during low census periods. This facility uses 12-hour shifts, limiting the ability of the nurse to complete the education on sepsis either before or after a long work shift. During the educational sessions, the hospital census on the medical-surgical floor was lower and the nurses were able to participate during low census time.

The validity of self-reporting may have been impacted by the nurse that completed the pre-test and post-test survey questionnaire in a positive manner. The small sample size and department of employment were limitations that have the ability to impact the generalizability of the findings. Nurses working in the emergency room verbalized being more familiar with the sepsis protocol. Most of the patients that enter the emergency room with severe sepsis will be transferred to the larger hospital. This would limit the knowledge and use of sepsis protocol and laboratory values for the nurses that do not work in the emergency room. Future projects could include demographic

information to be able to identify the confidence level of the nurse that works in emergency services, compared to the nurse working in the other departments.

Despite the limitations, this research does have the ability to improve patient outcomes related to sepsis in this hospital with early identification and treatment. Behavior change and confidence of the nurse is another aspect of the educational process that will help improve patient outcomes. When the nurse is more confident knowing the Surviving Sepsis Guideline bundles and early symptoms of sepsis, a change in the behavior of the nurse to implement the established protocol for sepsis happens (Capuzzo et al., 2012). Future education is needed for the newly hired staff, as well as annual education on sepsis to help nurses and other staffs maintain sepsis knowledge.

Several previous studies have identified improved patient outcomes related to sepsis as a result of an educational intervention. Capuzzo et al. (2012) educated staff also focusing on early clinical signs of sepsis using the Surviving Sepsis campaign. The results showed that the before and after study improved patient outcomes and significantly reduced mortality in that hospital. Nguyen et al. (2012) implemented sepsis education in a community-based hospital. Results of this education resulted in early treatment with intravenous fluid bolus and appropriate antibiotics. Sepsis education improved early therapeutic interventions and contributed to improved patient outcomes (Nguyen et al., 2012).

Another study by Chen et al. (2013) related positive patient outcomes with decreased mortality rates as a result of a national education related to sepsis in Taiwan. The results indicated the biggest impact was with the use of lactic acid levels to identify sepsis and the use of antibiotics (Chen, Chang, Pu, & Tang, 2013). The use of lactic acid levels at the project hospital became available within the last year and the number of lactic acid levels being conducted hospital wide is increasing (K. Boettcher, personal communication, March 6, 2015).

Opportunities to improve patient outcomes related to sepsis can be obtained using multiple learning strategies, including simulation and debriefing. Self-confidence related to identification of sepsis and behavior change can be enhanced with education. Weaver (2015) discusses the need to bridge the "theory-practice gap" (p. 20) using simulation. Complex scenarios using simulation replicate actual events and allow the learner the ability to learn how to handle real life situations. Debriefing is considered a critical part of simulation to help facilitate learning and confidence. Self-confidence shapes the individual performance (Weaver, 2015). The nurses in this project reported higher confidence levels following the education (Table 1).

Debriefing during this project was the final part of the project. Shinnick et al. (2011) described debriefing as valuable for "producing gains in knowledge" (p. e109). During the debriefing, discussion about the type of antibiotic ordered for the different infections in the scenario was a big part of the learning. Not knowing the source of the

infection, the protocol called for broad spectrum antibiotics to be given. The debriefing was also a time when the participants discussed the priority for mixing and hanging the different antibiotics and fluids and how to decide which is needed first when only one intravenous line is established. Use of intraosseous sites was also discussed in the debriefing, when the septic patient had poor intravenous access. The debriefing often took longer than the actual simulation scenarios with discussion noted with all participants. Debriefing was a valuable part of the education project.

Implications for practice include the nurse that knows the new 2012 Surviving Sepsis Bundle guidelines and initiates early and aggressive treatment following those guidelines. Awareness of sepsis and the high risk procedures and patient conditions will also help the nurse to identify patients with possible sepsis earlier. These research findings help to support the need for critical access hospitals to continue spending money and utilizing resources for continuing education. These findings also help support the need for manikins and simulation supplies to have a room dedicated for educational programs that focuses on active learning strategies.

Identification of vulnerable populations is another implication for nursing practice. Many older adults reside in this rural area. This project focused on the older population. Future education for the vulnerable newborn and pediatric population is needed. The pediatric population is another vulnerable group that may present with early sepsis that is missed. Children may present with atypical symptoms or an elevated lactic

acid level with corresponding vital signs that go unnoticed by the nurse (Duffy & Maloney-Harmon, 2015; Mussap, 2012; Shah & Padbury, 2014).

Another aspect of pediatric sepsis is the ability of the child to compensate for hypotension with tachycardia. Education about sepsis must continue in all clinical departments. Education that focuses on the pediatric population is vital because they often present with atypical symptoms and vital sign changes when septic (Duffy & Maloney-Harmon, 2015). This project can be maintained and sustained with education that focuses on vulnerable populations. Comparing and contrasting the pediatric and older adult patient that presents with sepsis is one way to help focus on the atypical symptoms. Pediatric manikins could be added in the future to the simulation laboratory to allow nurses to practice and maintain their skills, such as intraosseous insertion (Duffy & Moloney-Harmon, 2015).

Education related to sepsis needs to be offered on a regular basis. This project is just the start of the need for ongoing education related to sepsis. Data collection on sepsis rates is also needed. Education also needs to be extended out to the long-term care facilities. Wang et al. (2012) identify the older adult with many co-morbid conditions as being high risk for becoming septic. An association exists between chronic medical conditions and high risk of having sepsis (Wang et al., 2012). Education related to sepsis needs to be extended to the nurses at assisted living and long term care facilities, as well as home health nurses. Identification of vague, early signs of sepsis will help promote the

patient getting the emergency room sooner. Education is needed outside of the hospital setting if early identification of sepsis is going to be recognized and rapid transfer to the emergency room is initiated.

Input from the SDWG is vital to support timely and essential education to improve patient outcomes specific for this hospital. The SDWG committee is responsible for yearly skills fair education. This group works closely with the infection control nurse in the annual education and has the ability to help carry this project forward in the future.

Recommendations following this project would be to provide the nurses scheduled time off from work to complete continuing education. This would improve the sample size by improving the number of nurses that have dedicated time complete the education. Another recommendation is to include sepsis education in the new employee orientation.

This project educated nurses in a critical access hospital utilized active and hands-on learning methods. Education on the pathophysiology for the early signs of sepsis helped the nurse identify why early changes happen. Many of the nurses employed at this hospital have never had a formal pathophysiology class within the curriculum of the associate-degree nursing program they attended. Pathophysiology helps the nurse understand the complex changes that happen with sepsis.

Vulnerable populations, including the elderly were discussed. The education session was followed by simulation using different scenarios. Laboratory values,

intravenous fluid bolus, and administration of antibiotics and vasopressors per protocol were reinforced during the simulation. Debriefing followed the simulation. Levett-Jones and Lapkin (2014) identify debriefing as an "integral component of all simulation-based learning experiences" (p. 58) that is a critical aspect of the simulation experience. The debriefing actually took longer than the simulation scenarios and included input from all participants. Debriefing helped to summarize the information important to the learner.

This project is just the beginning of education that promotes evidence-based practice to improve outcomes related to sepsis. The project can be maintained with education to a wider nursing audience, including home health and long-term care nurses. The project will need to have a dedicated educator that is willing to keep up with the recommendations from the Surviving Sepsis Campaign Guidelines. Ongoing education to sustain the work that this project has begun is very important to bring awareness of the subtle signs of sepsis that are often overlooked. Data collection of rates of sepsis and morbidity related to sepsis will help support the need for this educational project.

The number of sepsis screenings done every shift that identify a patient with sepsis is data that can help support the continued need for ongoing sepsis education. In the future, the number of sepsis cases can be recorded and used to help measure the effects of the project. This project can be incorporated into the new employee orientation process, especially for the healthcare workers that are at the bedside. This would include

not only the nursing staff, but the paramedics, respiratory therapists, physical therapists, and others on the healthcare team (AACN, 2006).

This project fulfils several of the essentials established by the American Association of Colleges of Nursing (2006). The AACN Essentials I Scientific Underpinnings for Practice that reflects the complexity of sepsis and the need to understand the pathophysiology that cause early and detectable signs of this overwhelming infection. AACN (2006) Essential II Organizational and Systems Leadership for Quality Improvement and Systems Thinking was fulfilled by working to implement and evaluate this project to provide quality of care and patient safety. AACN (2006) Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes is the ongoing project that educates other members of the healthcare team. Finally, AACN (2006) Essential VII Clinical Prevention and Population Health for Improving the Nation's Health was fulfilled with early identification and interventions necessary to improve detection of sepsis with implications to improve the population health.

Self-reflection was also part of the project process. Providing education related to sepsis has helped me to see that education has great implications for practice change. The focus was on the hospital nurse, but education needs to be extended out to the nurses and caregivers that are providing care to the frail elderly in the home and long term care setting. Education has been scheduled with several area long-term care facilities for me to

provide sepsis education to the staff. In retrospect, I would change the education session to include more nurses and staff from various departments within the facility. Overall, this project was well developed and implemented using PowerPoint, simulation, and debriefing utilizing adult and social learning theories. The future professional development needs to include the use of high fidelity manikins with more simulation and debriefing for staff to learn together.

Section 5: Scholarly Product for Dissemination

Interrupting the Sepsis Process with an Evidence-Based Education Intervention

Abstract

Sepsis is a concern, especially for the vulnerable populations. The early signs of sepsis are vague and often hard to detect. But when detected early, it is treatable with antibiotics and fluid resuscitation. When a nurse is unaware of the early signs, treatment is delayed. Without treatment, multiorgan failure progresses quickly. To teach nurses about changes in patient condition and thus help them become more confident in identifying sepsis, an educational intervention was created using a PowerPoint presentation, simulation, and debriefing. The goal was to increase awareness of sepsis in order to improve detection of the signs of sepsis and early management. The purpose of this project was to educate nurses working in a critical access hospital on the early signs of sepsis, laboratory values, and the 2012 Surviving Sepsis Campaign Guidelines. Adult learning theory and social learning theory guided this project. The education was implemented and evaluated using a pre-post survey which demonstrated an increased confidence level in early sign and symptom recognition, identification of laboratory values, and implementation of the guidelines for treating sepsis. The confidence level improved following the education session in all three areas. Interrupting sepsis based on evidence-based practice improves the outcomes for the patient with sepsis, as well as improve nurses' confidence in identifying sepsis in the early stages via clinical changes and laboratory values.

Introduction:

Early signs of sepsis are often subtle. When sepsis is not identified early, patient outcomes decrease. Ongoing education for the nurse to identify the early changes of sepsis is needed. Nurses are in a vital role to identify early clinical changes in a patient that might signal sepsis. The 2012 Surviving Sepsis Campaign Guidelines discuss the screening of all patients for potential sepsis (Surviving Sepsis Campaign, 2014). Knowing the signs of sepsis and interventions that are based on evidence-based guidelines can help save lives (Dellinger et al., 2013; Miller, 2014).

Vulnerable populations are at higher risk for becoming septic. Older adults age 85 and older have a 30 times higher rate of hospitalization for sepsis than those younger than 65 years of age (CDC, 2014). Older adults often exhibit signs of infection in atypical ways. Education is needed for the nurse to identify early sepsis, including the older adult that might not demonstrate classic signs of infection.

Adult learning theory and social learning theory provided the theoretical framework for the project. Adult learning theory guides the adult learner to be motivated in learning information that is immediately useful and practical (Cooper, 2009). Bandura's social learning theory is described as learning from watching others.

Simulation using manikins allows the nurse to learn about the early detection and treatment of sepsis being part of the simulation. Simulation with hands-on learning provides the nurse an opportunity to actually do the skill and learn in a safe environment that promotes "observational learning or modeling" (Rutheford-Hemming, 2012, p. 132).

Debriefing was used after each simulation allowing the participants to reflect, explore, and discuss what they had just learned (Shinnick, Woo, Horowich, & Steadman, 2011). Debriefing allows the nurses to discuss the scenario with other participants to identify what they did well, and how they can improve from what they learned. Debriefing is described as the cornerstone of simulation. This fits well with adult learning principles described by Knowles (Gardner, 2013). Wickers (2010) describes debriefing as being most successful when the learner feels safe and in a supportive environment. Debriefing allowed all participants to share and ask questions.

Improved knowledge can prevent the nurse from missing the early signs of sepsis or delaying treatment based on the 2012 Surviving Sepsis Guidelines Campaign. Implementation of an educational program designed to make nurses aware of the early signs of sepsis can contribute to higher survival rates (Nguyen, Schiavoni, Scott, & Tanios, 2012). Education has the ability to improve the confidence of the nurse to identify sepsis. This education can have an impact on patient outcomes based on current evidence-based practice (Capuzzo et al., 2012).

Methods:

The population for this project was nurses at a rural, critical access hospital. Any nurse from the facility was allowed to attend, providing a convenience sample. This project included nonprobability sampling. Pretest-posttest questionnaires were developed and collected for data. Participant confidentiality was maintained.

Participants completed a pre-education survey using a three point rating scale (very confident, confident, minimally confident) to assess the nurse's confidence level when identifying early signs of sepsis, laboratory diagnostic values for sepsis, and implementation of the 2012 Surviving Sepsis Campaign Bundle. The nurses then completed an educational program on sepsis using PowerPoint, simulation, and debriefing. Following the debriefing, the nurses completed a post-education survey with the same three questions to assess the confidence level. Results were analyzed and calculated to demonstrate the number and percentage of responses given by the participants for confidence level showing pretest-posttest education data.

Results:

During this project, 17 nurses participated. This represents 23.6% of the nurses at this facility. No nurses were excluded from the project and all of the participants completed the entire project. The pretest-posttest survey was completed anonymously. The project was completed over several different days and hours to minimize the barriers associated with shift work.

The results demonstrated an improved confidence level in the identification of early symptoms, laboratory values used to detect sepsis, and implementation of the sepsis bundles. The greatest improvement using self-rated scores was noted in identification of early symptoms with 94.1% or 16 of the nurses indicating they felt very confident following the education. Pre education scores indicated that only one nurse was very confident before the education.

The area with the least improvement noted was in the laboratory diagnostic tests for sepsis. Confidence was 76.5% before the education. The post education survey demonstrated 29.4% confidence and 70.6% of the respondents reporting being very confident with specific laboratory tests needed to diagnose sepsis.

The third question, Implementation of the Surviving Sepsis Campaign Bundles identified 58.8% of the nurses minimally confident before the education. Self-confidence related to the implementation of the bundles improved following the education with 58.8% reporting very confident and 41.2% confident (see Table 1).

Table 1 Confidence Level Before and After Education Session

	Pre Questionnaire Number of participants (%)	Post Questionnarie Number of participants (%)
Early signs and symptoms of sepsis	Very confident 1 (0.05) Confident 11 (64.7) Minimally Confident 5 (29.4)	Very confident 16 (94.1) Confident 1 (0.05) Minimally Confident 0 (0)
Early laboratory diagnostic tests for sepsis	Very confident 1 (0.05) Confident 13 (76.5)	Very confident 12 (70.6)

	Minimally confident 3 (17.6)	Confident 5 (29.4) Minimally Confident 0 (0)
Implementation of the Surviving Sepsis Campaign Bundle for sepsis	Very confident 0 (0) Confident 7 (41.2) Minimally Confident 10 (58.8)	Very confident 10 (58.8) Confident 7 (41.2) Minimally Confident 0 (0)

N = 17 participants

Discussion

Education has the ability to impact the confidence of the nurse caring for patients that have early signs of sepsis. Participants in this education project felt more confident about sepsis identification, laboratory values, and implementation of the established protocol after completing this education using simulation and debriefing. The purpose of this project was to bring awareness of sepsis to the nurse and the need for early identification of the subtle signs that can indicate a patient has sepsis. The questions in this project were answered.

Education related to sepsis also has implications for other members of the healthcare team. Collaboration with educational offerings involving other departments within the hospital have been shown improve patient outcomes (Capuzzo et al., 2012; Chen, Chang, Pu, & Tang, 2013). This project involving PowerPoint, simulation, and debriefing could be used to educate respiratory therapists, paramedics, and nurses together to promote collaboration. Timely treatment for sepsis is accomplished when all

members are working together with a common goal of early detection and treatment of sepsis.

This project also has implications for educating nurses on a variety of topics and skills using manikins in simulation followed by debriefing. Research supports using simulation and debriefing in nursing (Pike & O'Donnell, 2010; Shinnick, Woo, Horwich, & Steadman, 2011; Weaver, 2015). Pre-licensure nursing education can also benefit from the use of simulation and debriefing to promote learning. Nurse educators understand the need for active learning strategies. Adult learning theory and social learning theory guide the principles for nursing education (Billings & Halstead, 2012).

Future education using simulation and debriefing will provide a healthcare team that is updated on best practices to provide timely and evidence-based care. This project adds to the body of knowledge for active learning based on adult learning theory and social learning theory. Education using simulation and debriefing related to sepsis is just the beginning of what can be accomplished to improve patient outcomes.

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Appendix

Appendix A: IRB Approval

Institutional Review Board Approval 03-02-15 #0265967

Appendix B: Sepsis Education Scale Pre-Questionnaire

Instructions: Complete the following questionnaire related to sepsis.

	VC	C	MC

How confident are you in identification with respect to the following?			
Early signs and symptoms of sepsis?	5	3	1
Early laboratory diagnostic tests for sepsis?	5	3	1
Implementation of the Surviving Sepsis Campaign Bundle for sepsis?	5	3	1

Note. VC = very confident C = confident MC = minimally confident

Appendix C: Sepsis Education Scale Post-Questionnaire

Instructions: Complete the following questionnaire related to sepsis.

	VC	C	MC
How confident are you in identification with respect to the following?			
Early signs and symptoms of sepsis?	5	3	1
Early laboratory diagnostic tests for sepsis?	5	3	1
Implementation of the Surviving Sepsis Campaign Bundle for sepsis?	5	3	1

Note. VC = very confident C = confident MC = minimally confident

Appendix D**:** PowerPoint Outline

1. Definitions
2. Facts and Statistics
3. Risk Factors
4. Purpose and Goals
5. Pathophysiology of sepsis
6. Laboratory Values related to sepsis detection
7. Clinical signs of early sepsis
8. Vulnerable Populations
9. Surviving Sepsis Campaign Guidelines 2012
10. Simulation Scenarios and Debriefing (diverticulitis, stroke with indwelling catheter, fall at long-term care from confusion, contaminated wound).